ORIGINAL ARTICLE

Results of a Workplace Health Campaign

What Can Be Achieved?

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SUMMARY

Background: Effective health promotion in the workplace is now essential because of the rising health-related costs for businesses, the increasing pressure arising from international competition, prolonged working lives, and the aging of the work force. The basic problem of prevention campaigns is that the target groups are too rarely reached and sustainable benefits too rarely achieved. In 2011, we carried out a broad-based health and fitness campaign to assess how many personnel could be motivated to participate in a model study under nearly ideal conditions.

Methods: 1010 personnel were given the opportunity to participate in various kinds of sports, undergo sports-medicine examinations, attend monthly expert lectures, and benefit from nutritional offerings and Intranet information during work hours. Pseudonymized questionnaires were used to classify the participants according to their exercise behavior as non-active, not very active, and very active. The participants' subjective responses (regarding, e.g., health, exercise, nutrition, and the factors that motivated them to participate in sports or discouraged them from doing so) were recorded, as were their objective data (measures of body size and strength). The duration of the study was one year.

Results: 490 of the 1010 personnel (48.5%, among whom 27.2% were non-active, 44.1% not very active, and 28.7% very active) participated in the initial questionnaire and testing. By the end of the study, this figure had dropped to 17.8%; diminished participation affected all three groups to a comparable extent. A comparison of dropouts and non-dropouts revealed that older age was a stable predictor for drop-out (bivariate odds ratio [OR] 1.028, p = 0.006; multivariate OR 1.049, p = 0.009). The study participants reported beneficial effects on their health and health awareness, performance ability, psychological balance, stress perception, exercise and dietary behavior.

Conclusion: Even under optimal conditions and with high use of staff resources, this model study (which cannot be universally implemented) did not lead to comprehensive and sustained personnel participation. This finding suggests that the currently available prevention instruments are insufficient for the effective and cost-efficient promotion of health and fitness in the workplace.

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Technological progress and prosperity have triggered profound behavioral changes in the population. Nowadays, most people do not get enough exercise, eat the wrong things, and often have other health risk factors (1–5). One visible result of these poor everyday habits and attitudes—many of which are established in the teenage years—is a high prevalence of overweight and lifestyle-related diseases such as diabetes mellitus, cardiovascular diseases, and certain kinds of cancer (3, 6–9). The rising number of chronic diseases with onset at increasingly young age, while at the same time life expectancy is increased, has contributed to the explosion in costs carried by health and welfare systems (10–14). At €293 billion, health care costs in 2011 amounted to more than 11% of Germany's gross domestic product (GDP) (14). This negative trend is gradually affecting the economy. This is more than just a matter of costs attributable to sick days (absenteeism). Studies show that the real losses caused to business and industry by health-related impairments are many times higher (15–17). Long before chronic illness and absenteeism actually occur, those affected may be working at lower capacity and reduced productivity (presenteeism) (15). Given rising health costs, an aging workforce, and international competition, the urgency and necessity of effective health and fitness campaigns is obvious.

Business and industry, statutory health insurers, and politicians have long pursued the goal of increasing health promotion and disease prevention. The poor success of numerous campaigns, however, shows how difficult it is for those who are targeted to abandon behaviors that harm their health and to achieve long-term improvements in exercise and nutritional behavior (18–20). This reveals the basic problem—so far unresolved—of many prevention campaigns: they rarely reach the real target groups, and rarely achieve long-lasting success (20, 21).

At the center of the present study is the approachability of workplace personnel and their interest and participation in a model study designed as a 1-year health and fitness initiative (HFI). The campaign was conducted at a Bundeswehr (German armed forces) agency with 1010 personnel who—as in many civilian administration or service offices—mainly did desk work. Compared to civilian life, the Bundeswehr provides much better opportunities for health and fitness promotion: for example, 180 minutes a week are

TABLE 1

Range of activities on offer in the health and fitness initiative

Sports courses	Beginners	18 courses including Nordic walking, swimming, tennis, volleyball, and muscle building and condition training (35)
	Advanced	
Nutrition	Menu at the canteen	"Healthy eating," calorie and nutritional value information
Education	Intranet health forum	Current information about the initiative, linked from the agency's intranet home page
	Presentations (lectures) by expert speakers	Topics in health, sports, and nutrition *(see Figure)*
Medical health and fitness check-ups	At beginning and end of the initiative	Medical history/examination/advice, anthropometric measurements, lung function tests, isometric muscle strength tests, postural coordination testing

scheduled for sports activities, because of the great importance of health, stamina, and ability for soldiers. The necessary infrastructure (sports centers etc.) and trained instructors (physical training instructors, sports coaches) are also available. In addition, soldiers have to pass a Basic Fitness Test every year (22). However, a favorable environment is not necessarily enough on its own to lead to the desired healthy, performance-maintaining lifestyle: even among soldiers, lack of exercise, and poor nutritional and leisure habits are on the increase, one sign of which is a rise in obesity and its associated diseases (23–26).

In the model campaign, the existing range of preventive activities was greatly increased. In the run-up to the campaign, the personnel were invited by personal letter from the director of the agency and anonymous questionnaires were administered that included questions on sport likes and dislikes, and what might be a barrier or might motivate them to take part in sport. All civilian and military personnel were able to make use of a comprehensive range of sport activities during office hours, attend monthly lectures by experts on health, nutrition, exercise, and stress management, and take part in health and fitness checks. A wider range of food and information was also provided for the midday meal, and a personnel forum was set up, linked to the agency's intranet home page. The goal was to motivate as many personnel as possible to take part and change their thinking habits in favor of a healthy, performance-maintaining lifestyle.

Specifically, in these near-optimum conditions, the following questions were addressed:

- How many personnel did the campaign actually reach?
- How many were still actively taking part after 1 year?
- What are the differences between the physically active and the physically inactive?

Methods

The HFI was carried out in 2011 in a Bundeswehr agency in Cologne as a joint research project by the Central Health Service Institute of the Bundeswehr in Koblenz (*Zentrales Institut des Sanitätsdienstes der Bundeswehr Koblenz*) and the German Sport University Cologne (*Sporthochschule Köln*). The data collection was approved by the ethical commission of the German Sport University Cologne.

Range of activities on offer in the HFI

All personnel working for the agency were permitted to make use of the extensive range of sports, health and fitness checks, and nutritional and other information on offer as shown in *Table 1*.

Study participants

At the start of the 1-year study period in January 2011, there were 1010 personnel (199 women) at the agency. The 105 civilian (70 women) and 905 military personnel (129 women) were invited by personal letter from the director of the agency. Before the start of the campaign, information sessions were held by the two research bodies. Participation in and attendance at all sports activities, data collections, and health and fitness checks was voluntary. During the study period, 141 persons were posted into the agency and 114 were posted away.

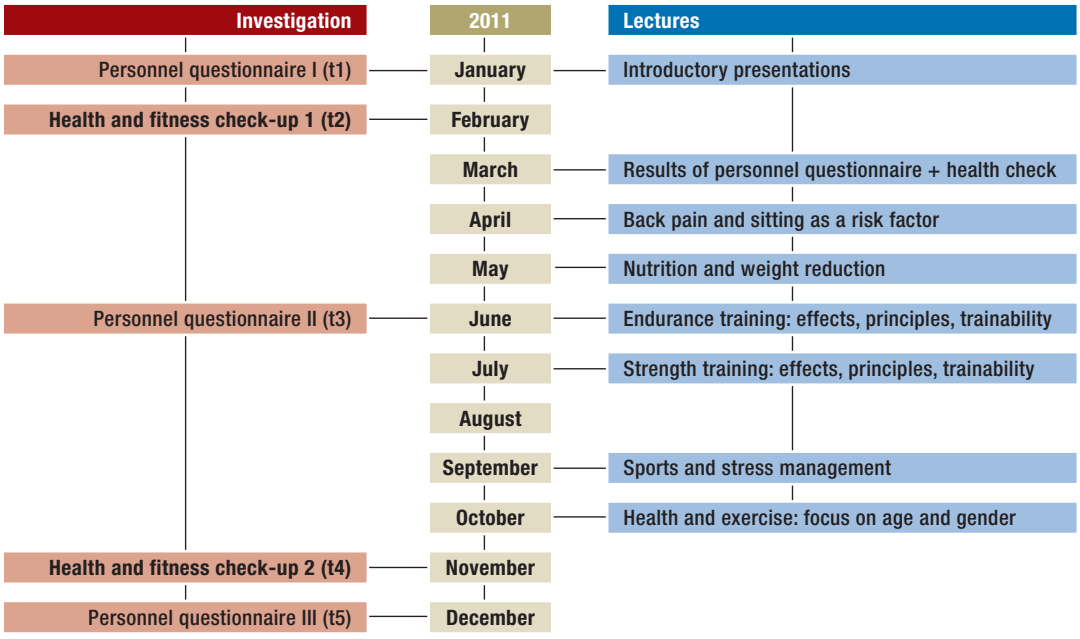
Study design

Study data were acquired by means of questionnaires and during the health and fitness checks *(Figure)*. The questionnaire at timepoint t5 was identical to that at timepoint t4, which was carried out during the second health and fitness check. For the analysis presented here, the questionnaire and examination data at the start of the study (t1/t2) and at the end of the study (t4/t5) were grouped together.

Examination procedure

At the beginning and end of the study, participants had the opportunity to be examined by a sports medicine specialist. The examination included measurement of body dimensions (body weight, height, waist circumference, skin fold thickness, etc.) using standardized measuring instruments (anthropometer,

FIGURE



Investigation schedule and lecture topics in the 2011 model health and fitness initiative; in November 2012 the most important results of the study were presented to the agency's personnel. Modified from (35); reproduced with the kind permission of Beta Verlag, Bonn)

calibrated weighing scales, Harpenden caliper) (27, 28), calculation of body mass index (BMI), and body fat percentage (29, 30), and isometric maximum strength of elbow flexion, knee extension, and grip strength (31). The questionnaires, in addition to sociodemographic and anthropometric data (such as birth year, sex, height, weight, and smoking status), recorded data on the following areas:

- Health (subjective sense of health, physical and work capacity, and stress, feeling good or otherwise about own body weight)
- Nutritional habits (healthy nutrition, quantity consumed)
- Exercise behavior (including physical activity in everyday life; sport: frequency, motivators, barriers)
- Influence of the campaign on health, sense of health, physical and work capacity, sense of stress, sense of psychological balance, and quality of sleep, and on exercise and nutritional behavior was recorded at the end of the study.

The answer formats for items already validated in other studies were simple and multiple answer scales as well as Likert type scales. Participants were divided into "non-active" (reported frequency: "never/rarely"), "not very active" (took part in sports activities 1 to 3 times per week), and "very active" (sports activities more than 3 times per week), according to their reported frequency of participating in sports at the beginning of the study. Persons who had taken part in the first questionnaire (t1) or the health and fitness check (t2) were defined as study participants. Dropouts were defined as participants who took part in neither the second health and fitness check (t4) nor the final questionnaire (t5).

Data presentation and statistical analysis

Descriptive measures were calculated as frequencies, means and standard deviations. Frequencies were compared using the chi-square test. Differences in interval variables were investigated using analysis of variance and Student's t-test with the Bonferroni correction.

For post-hoc analyses, the Scheffé test was used. The Kruskal–Wallis test was employed for ordinal variables. At the end of the study, predictors of participation were determined using logistic regression. For all analyses, a significance level of 5% was defined.

Results

For reasons of data protection, the only possible comparison of the overall group of agency personnel with the study participants was on the basis of sex distribution. This showed no significant difference (agency personnel: 80.3% men, study group: 82.0% men, $p = 0.332$).

Participation

At the start of the HFI (t1/t2), 490 of the invited 1010 personnel (48.5%) took part. At the end of the study (t4/t5), the number of participants was 180 (17.8%).

TABLE 2

Age, anthropometric parameters, percentage of smokers, and maximum strength values for men and women in the non-active, not very active, and very active groups (mean and standard deviation)

Variable	Men			
	Non-active n = 110	Not very active n = 165	Very active n = 114	All N = 389
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Age (years)	42.8 (9.0)	39.9 (9.0)	38.1 (9.2)	40.2 (9.2)
Weight (kg)	89.4 (12.3)	90.6 (14.2)	87.3 (13.5)	89.3 (13.5)
Height (cm)	180.0 (6.4)	181.5 (6.4)	180.7 (6.5)	180.9 (6.4)
Body mass index (kg/m^2)	27.5 (4.0)	27.5 (3.7)	26.9 (3.7)	27.3 (3.8)
Waist circumference (cm)	95.2 (10.7)	94.5 (10.2)	91.2 (11.0)	93.7 (10.7)
Body fat (%)	29.7 (6.2)	27.9 (5.0)	25.0 (6.1)	27.5 (5.9)
Percentage of smokers in group (%)	26.3	34.1	18.2	28.2
Maximum grip strength (N)	528.2 (84.3)	533.9 (91.1)	534.0 (84.4)	532.4 (87.1)
Maximum elbow flexion strength (N)	183.9 (34.3)	198.1 (34.4)	203.0 (47.5)	195.9 (39.4)
Maximum knee extension strength (N)	566.7 (111.8)	600.7 (108.9)	604.4 (139.9)	592.9 (120.8)
Variable	Women			
	Non-active n = 19	Not very active n = 44	Very active n = 22	All N = 85
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Age (years)	37.3 (11.2)	36.1 (9.6)	34.7 (9.0)	36.0 (9.8)
Weight (kg)	81.3 (15.3)	69.0 (11.1)	70.3 (11.1)	71.6 (12.7)
Height (cm)	167.7 (6.3)	167.9 (6.3)	170.1 (6.1)	168.4 (6.3)
Body mass index (kg/m^2)	29.3 (5.9)	24.8 (3.9)	24.3 (3.6)	25.5 (4.5)
Waist circumference (cm)	88.0 (13.1)	77.5 (9.7)	75.5 (8.8)	78.9 (10.9)
Body fat (%)	37.9 (6.2)	33.2 (4.8)	32.4 (4.6)	33.9 (5.3)
Percentage of smokers in group (%)	29.5	30.9	22.8	28.2
Maximum grip strength (N)	377.1 (70.8)	355.0 (57.7)	356.6 (73.1)	359.4 (64.1)
Maximum elbow flexion strength (N)	116.8 (23.1)	116.2 (15.5)	118.7 (23.3)	117.0 (19.1)
Maximum knee extension strength (N)	413.0 (83.8)	414.1 (92.9)	421.9 (79.4)	415.8 (86.7)

SD, standard deviation

Comparison of the non-active, not very active, and very active

Core descriptive measures (age, anthropometric variables, percentage of smokers, maximum strengths) at t1/t2 are listed in *Table 2*.

The non-active group differed from the two other groups in respect of several parameters. In both sexes the non-active group had a higher body fat percentage ($p \leq 0.012$ in each case), and among the women this group had a larger waist circumference ($p = 0.005$) than the very active group. Compared with the two active groups, non-active men were also older ($p \leq 0.031$ in each case) and had a lower maximum elbow flexion strength ($p \leq 0.048$ in each case). Non-active women weighed more ($p \leq 0.043$ in each case) and had a higher BMI ($p \leq 0.007$ in each case).

Table 3 summarized participants' statements about subjective sense of health and nutritional and exercise behavior. Here, too, non-active participants differed significantly from the other two groups: compared with the not very active and the very active, a smaller percentage of the non-active felt healthy ($p<0.001$) and felt good about their own body weight ($p \leq 0.015$ in each case). They more often categorized their eating habits as unhealthy compared with the two other groups ($p \leq 0.008$ in each case) and as excessive compared with the very active group ($p = 0.001$). A higher percentage of the non-active group felt stressed in their everyday life ($p \leq 0.010$ in each case). Almost three quarters of the non-active group reported rarely being physically active in their everyday life ($p<0.001$ in each case). Only 7.9% of the non-active group reported regularly taking part in on duty sport activities—a marked difference from the not very active (67.6%, $p<0.001$) and very active groups (84.6%, $p<0.001$). Almost all of the non-active (96.1%) and not very active groups (96.6%) stated that they would like to do more sport in future.

TABLE 3

Subjective ratings* to questions about health, nutrition, stress, and physical activity in daily life at t1/t2

Statements	Subgroup			
	All	Non-active	Not very active	Very active
I feel healthy	87.5	74.4	89.9	96.3
I feel stressed out in everyday life	30.3	41.4	25.9	26.3
I feel comfortable with my current weight	45.4	32.0	45.5	58.2
My diet is rather unhealthy	18.6	29.8	17.2	10.6
I tend to eat too much	44.2	55.0	43.9	34.6
I am rarely physically active in my everyday life	42.8	74.4	30.1	31.6
I regularly take part in on-duty physical excercise	56.4	7.9	67.6	84.6
I would like to do more sports activities in future	91.9	96.1	96.6	80.6

*Results shown are percentages of study participants (n = 474) and of the non-active (n = 129), not very active (n = 209), and very active subgroups (n = 136) who agreed with the statements

The motivators for sport are listed in *Table 4*. Health reasons, physical performance, enjoying sport ("sports are fun"), stress reduction/compensation, and weight reduction were all reported about equally often. The non-active group reported the motivators "sports are fun" ($p<0.001$) and "social experience" ($p \leq 0.023$) less often than the other groups.

In total, 37% of respondents reported having no barriers to taking part in sport. Of the reported barriers, lack of time (53.3%) and health reasons (35.6%) were the most often mentioned. The other barriers included in the questionnaire *(Table 5)* were only mentioned sporadically. The two active groups reported fewer barriers ($p = 0.032$). In the non-active group, 23.4% did not report any barrier, 55.3% reported one barrier, 19.2% two barriers, and 2.1% three barriers.

HFI dropouts and non-dropouts

Dropouts and non-dropouts were investigated in relation to activity status, age, sex, body fat percentage, BMI, smoking status, motivators, questions about health, stress, as well as nutritional and exercise behavior in a search for predictors. Only age (odds ratio [OR]: 1.028; $p = 0.006$) and the motivator "health reasons" (OR: 2.503; $p = 0.018$) showed a significant bivariate correlation. The significant influence of age was also visible in the multiple model of all reported factors (OR: 1.049; $p = 0.009$). None of the other factors was significant. The motivator "health reasons" was only significant (OR: 2.152; $p = 0.045$) when the factors "body fat," "BMI," and "nutritional behavior" were not taken into account.

Effect of the HFI on participants

Potential effects of the HFI were analyzed on the basis of the anthropometric data, maximum strength values, and self-reported data on subjective sense of health and nutritional and exercise behavior. In men, body weight ($n = 94$, $\Delta = -0.9$ kg, $p = 0.002$), waist circumference ($n = 94$, $\Delta = -1.0$ cm, $p = 0.001$), and BMI ($n = 94$, $\Delta = -0.3$ kg/m^2, $p<0.001$) went down. For women, no significant differences were found in any of the anthropometric data. For maximum strength values, among men both gains (grip strength: $n = 90$, $\Delta = 20.7$ N, $p = 0.002$) and losses were found (elbow flexion: $n = 89$, $\Delta = -8.5$ N, $p<0.001$).

Positive changes were identified in the questionnaire data. The percentage of non-active personnel, who stated they were rarely physically active in their everyday life, went down markedly ($\Delta = -60.8\%$, $p = 0.002$). In the non-active ($\Delta = -24.0\%$, $p = 0.019$) and not very active groups ($\Delta = -12.9\%$, $p = 0.004$), the percentage of those eating unhealthily went down. The final questionnaire revealed that participants in all three groups reported positive influences ($p \leq 0.002$) on their health and sense of health, exercise and nutritional behavior, psychological balance, sense of stress, and physical and work performance.

Only in the non-active group was the subjective sense of a positive influence on work performance not statistically significant ($p = 0.018$, Bonferroni correction $P_{crit} = 0.006$).

Discussion

This model campaign can be regarded as successful on the basis of a number of indicators. In comparison to participation in other campaigns (32–34), uptake was quite high at 48%. Furthermore, over a quarter of participants were people who were not physically active—i.e. they belong to the primary target group that rarely responds to an approach. The longitudinal analyses and reported subjective experience of participants also support the idea that this was a successful prevention campaign. The answers to the questionnaires show high satisfaction with the campaign and positive evaluation of the range of options offered (35).

TABLE 4

Study participants' agreement at t1/t2 to the answer categories for the question: "What is your motivation for doing sport?"*

Motivation	All	Non-active	Not very active	Very active
Health reasons	19.5	21.3	19.0	18.9
Physical performance	19.3	19.9	18.8	19.5
Sports are fun	18.2	15.2	19.1	19.2
Stress reduction/compensation	17.7	17.5	17.4	18.1
Weight reduction	15.3	18.0	14.6	14.3
Social experience	10.1	8.2	11.2	9.9
Total	**100**	**100**	**100**	**100**

*Results shown are for individual answer categories as percentages of the total number of positive answers in the overall group (n = 474) and in the non-active (n = 129), not very active (n = 209), and very active subgroups (n = 136)

TABLE 5

Study participants' responses at t4/t5 to the answer categories for the question: "Are there any barriers that prevent you from doing (more) sport (than you have been)?" Multiple answers were possible for this question*

Barriers	All	Non-active	Not very active	Very active
Not enough time	53.3	47.8	52.5	63.3
Health reasons	35.6	32.6	39.0	33.3
Among my friends, sports play a minor role	3.7	4.3	5.1	0.0
Sporting activities offered do not suit my needs	3.0	4.3	1.7	3.3
I do not like sports	2.2	6.5	0.0	0.0
I usually get enough exercise without doing sport	1.5	2.2	1.7	0.0
I find sport too exhausting	0.7	2.2	0.0	0.0
Total	**100**	**100**	**100**	**100**

*Results shown are for the individual answer categories as percentages of the total number of all reported barriers in the overall group (n = 178) and in the non-active (n = 47), not very active (n = 80), and very active subgroups (n = 51)

Looking at the important question of how many personnel reacted to the offer of preventive measures in an optimum environment, the picture is rather different. Despite being allowed to make use of all the opportunities during work time, receiving a personal invitation from the director of the agency (who actively took part), and the standing requirement (for military personnel, who made up 90% of all personnel) for exercise, most personnel at the agency did not take part in the campaign. Almost two thirds of the original participants did not even respond to the final questionnaire. Allowing for personnel turnover, the dropout rate was between 40% and 60%. This is comparable to rates reported in the literature (36–40, e1) and suggests that workplace-based health and fitness campaigns have poor chances of success. The individual reasons for dropping out (e.g., lack of time, lack of interest, posting) remain unknown. Interestingly, the dropout rate was the same in all three of the study groups. The comparison between dropouts and non-dropouts shows no clear predictors of "not dropping out" apart from age and the motivator "health reasons."

In evaluating the results of this study, its methodological limitations must be kept in mind. The large number of "non-participants" does not necessarily mean that all these non-participants take no exercise or are inactive during their time off. It may be that many prefer to pursue sports activities in their home environment, or give priority to their office duties (despite expressly being given time for sports on duty, and despite a standing requirement for all soldiers to exercise while on duty). One other weakness of this study is that, because of concerns on the part of the staff council, it was not possible to record details of sports activities (extent, intensity, duration) or of fluctuations in personnel. Not least, there is the question of how far these results can be extrapolated to other government agencies or private companies. On the one hand, there are marked differences between civilian and military work environments (e.g., turnover of personnel due to posting within the country or on service abroad). On the other hand, though, desk work is much the same whether it takes place in a civilian or a military office.

Furthermore, the spread of chronic disease, and the obesity intervention program introduced in 2000 (25), suggest that the German armed forces have not been left untouched by the negative health trends seen elsewhere (23, 24, 26).

Despite these limitations, however, what remains is a discouraging picture: even under the best conditions and at the cost of a great deal of time, personnel, and effort, the campaign failed to achieve long-term participation of workplace personnel on any large scale. This agrees with the findings of the study by Vanden Auweele and colleagues (e2), which investigated non-active adults. On the basis of their cluster analyses, the authors concluded that 60% were indifferent to the offer of preventive measures, and 25% actually rejected them. Of the women, only 17% were categorized as "approachable" about the offer of prevention. The difficulty of persuading inactive adults to take more exercise was also evident from the reported barriers to sports activity in the present study: about one quarter of the non-active group did not report a barrier, and more than 50% reported only one. Here, too, "lack of time" was far and away the most common reason (and it is often the generally accepted explanation/excuse) for not taking more exercise (21, e3, e4).

Given the downward trend in health and the numerous prevention campaigns that have been carried out, lasting improvement of exercise and nutritional behavior is too rarely achieved (20, e5). The comprehensive, costly range of preventive measures on offer in the present study will not be widely reproducible in the normal world of work. It must therefore be doubted whether effective and efficient health and fitness promotion is possible using currently available preventive instruments.

Irrespective of that question, improved resources for the promotion of performance and health are urgently needed (e6–e9). The question arises whether additional systems of incentives ("bonus systems") should be implemented. Monetary and other prizes can make a positive contribution to the promotion of health-aware behavior (e10–e13). For example, employers can offer incentives in the form of days off work. In principle, "penalty systems" (as in the case of driver's licenses and car insurance) or negative incentives (non-return of premiums/deposits, cf. [e13]) might be contemplated. We have not found any published data on the application or effect of penalty systems in the context of prevention and health. However, even without being able to estimate the actual outcome of such measures, an expansion of the currently available prevention instruments appears necessary.

Summary

It is to be feared that no general, long-lasting improvement in the exercise and nutritional behavior of the working population will be achieved through classical workplace-based health promotion. A recently published systematic literature review of workplace intervention programs has shown that education and provision of exercise opportunities alone have at best a small effect on absence due to sickness (e14). Early interventions for a healthy and productive lifestyle (e.g., physical activity in everyday living and/or during work breaks) are needed in every arena of life (e.g., kindergartens, schools, workplaces), and large financial resources should be committed to expanding them (e15, e16).

KEY MESSAGES

- An improvement in workplace resources to promote performance and health is urgently needed.
- Despite the best possible conditions and the time and effort put in by many people, a comprehensive health and fitness campaign failed to achieve large-scale, long-term participation by workplace personnel.
- The classical form of health promotion in the workplace is insufficient by itself to achieve long-term improvement in exercise and nutritional behavior.
- The German economy needs additional preventive instruments (e.g., incentive programs) and early interventions (in kindergartens, schools, workplaces, etc.) to establish healthy, productive lifestyles.

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Conflict of interest statement
The authors declare that no conflict of interest exists.

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